

SEQUENCE LISTING

<110> Novak, Rodger
Toumanen, Elaine

<120> NOVEL ANTIBIOTICS AND METHODS OF USING THE SAME

<130> 1340-1-016N1

<140> Unassigned

<141> 2000-01-28

<150> 60/084,399

<151> 1998-05-06

<150> 09/305,984

<151> 1999-05-05

<160> 76

<170> PatentIn Ver. 2.0

<210> 1

<211> 75

<212> DNA

<213> Streptococcus pneumoniae

<400> 1

atgagaaagg aatttcacaa cgttttatct agtgggtcagt tgcttgcaga caaaaggcca 60
gcaagagact ataata 75

<210> 2

<211> 25

<212> PRT

<213> Streptococcus pneumoniae

<400> 2

Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu Leu Ala

1

5

10

15

Asp Lys Arg Pro Ala Arg Asp Tyr Asn

20

25

<210> 3

<211> 75

<212> DNA

<213> Artificial Sequence

97

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<220>

<223> Description of Artificial Sequence: Encodes
modified Streptococcus Pneumonia peptide

<400> 3

atgagaaagg aatttcacaa cgttttatct gctggtcagt tgcttgcaga caaaaggcca 60
gcaagagact ataat 75

<210> 4

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Modified
Streptococcus Pneumonia peptide

<400> 4

Met Arg Lys Glu Phe His Asn Val Leu Ser Ala Gly Gln Leu Leu Ala
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Tyr Asn
20 25

<210> 5

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Encodes
modified Streptococcus Pneumonia peptide

<400> 5

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gcaagagacg ctaat 75

<210> 6

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Modified
Streptococcus Pneumonia peptide

<400> 6

Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu Leu Ala
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Ala Asn
20 25

<210> 7

<211> 42

<212> DNA

<213> Streptococcus pneumoniae

<400> 7

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<210> 8

<211> 14

<212> PRT

<213> Streptococcus pneumoniae

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<400> 8

Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu
1 5 10

<210> 9

<211> 33

<212> DNA

<213> Streptococcus pneumoniae

<400> 9

cttgagaca aaaggccagc aagagactat aat 33

<210> 10

<211> 11

<212> PRT

<213> Streptococcus pneumoniae

<400> 10

Leu Ala Asp Lys Arg Pro Ala Arg Asp Tyr Asn
1 5 10

<210> 11

<211> 84

<212> DNA

<213> Streptococcus pneumoniae

<400> 11

atggaattta tgagaaagga atttcacaac gttttatcta gtggtcagtt gcttgcagac 60
aaaagccag caagagacta taat 84

<210> 12

<211> 28

<212> PRT

<213> Streptococcus pneumoniae

<400> 12

Met Glu Phe Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln
1 5 10 15

Leu Leu Ala Asp Lys Arg Pro Ala Arg Asp Tyr Asn
20 25

<210> 13

<211> 1329

<212> DNA

<213> Streptococcus pneumoniae

<400> 13

atgaaacgaa caggtttatt tgcaaagata tttatctata ctttctcgat atttagtggt 60
ctggttatct gccttcattt agctatttat tttctttttc cttcgactta tctgagtcac 120
cgtcaggaaa ccattgggtca aaaggcaaca gccattgccc agtccctaga agggaaagat 180
aggcagagta tcgagcaagt gtttagacttg tattcccaga ctagtgatat caaggggacc 240
gtcaaaggtg agatgaccga ggacaagtta gaagtcaagg acagtcttcc tctggacaca 300
gaccgccaga caacctctct ctttattgag gagcgcgagg tgaaaacgca agacggtggt 360
actatgattc tccagtttct agcttccatg gatttacaaa aggaagcgga gcaaatcagt 420
ctccagtttc ttcctctatac cttgctggcc tcctttctga tttccctttt ggtggcctac 480
atctacgctc ggactattgt tgcaccgatt ttggaaatca agcgggtgac ccgtcggatg 540
atggacctgg attcccaagt gcgattgcgc gtggattcta aggatgagat aggtaatctc 600
aaggaacaaa tcaatagcct ctaccagcat ctcttgactg ttattgcgga cttgcatgaa 660
aagaatgaag ccattctcca gctggagaag atgaaggtcg aattcctacg aggagcttct 720
catgaattga aaacaccgct ggctagtttg aaaatcctaa tcgaaaatat gagagagaat 780
atcggtcggt ataaggatag agaccagtat ctgggagttg ccttggggat tgtggatgaa 840
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aaggggtctg gtatggggct ctttgtggtt aagagtctat tagaacatga aaaattagct 1260
tatcgtttcg agatggagga gaatagttta accttcttta tagattttcc aaaagtcgtc 1320
caagactag 1329

<210> 14
<211> 442
<212> PRT
<213> Streptococcus pneumoniae

<400> 14

Met Lys Arg Thr Gly Leu Phe Ala Lys Ile Phe Ile Tyr Thr Phe Ser
1 5 10 15

Ile Phe Ser Val Leu Val Ile Cys Leu His Leu Ala Ile Tyr Phe Leu
20 25 30

Phe Pro Ser Thr Tyr Leu Ser His Arg Gln Glu Thr Ile Gly Gln Lys
35 40 45

Ala Thr Ala Ile Ala Gln Ser Leu Glu Gly Lys Asp Arg Gln Ser Ile
50 55 60

Glu Gln Val Leu Asp Leu Tyr Ser Gln Thr Ser Asp Ile Lys Gly Thr
65 70 75 80

Val Lys Gly Glu Met Thr Glu Asp Lys Leu Glu Val Lys Asp Ser Leu
85 90 95

Pro Leu Asp Thr Asp Arg Gln Thr Thr Ser Leu Phe Ile Glu Glu Arg
100 105 110

Glu Val Lys Thr Gln Asp Gly Gly Thr Met Ile Leu Gln Phe Leu Ala
115 120 125

Ser Met Asp Leu Gln Lys Glu Ala Glu Gln Ile Ser Leu Gln Phe Leu
130 135 140

Pro Tyr Thr Leu Leu Ala Ser Phe Leu Ile Ser Leu Leu Val Ala Tyr
145 150 155 160

Ile Tyr Ala Arg Thr Ile Val Ala Pro Ile Leu Glu Ile Lys Arg Val
165 170 175

Thr Arg Arg Met Met Asp Leu Asp Ser Gln Val Arg Leu Arg Val Asp
180 185 190

Ser Lys Asp Glu Ile Gly Asn Leu Lys Glu Gln Ile Asn Ser Leu Tyr
195 200 205

Gln His Leu Leu Thr Val Ile Ala Asp Leu His Glu Lys Asn Glu Ala
210 215 220

Ile Leu Gln Leu Glu Lys Met Lys Val Glu Phe Leu Arg Gly Ala Ser
225 230 235 240

His Glu Leu Lys Thr Pro Leu Ala Ser Leu Lys Ile Leu Ile Glu Asn
245 250 255

Met Arg Glu Asn Ile Gly Arg Tyr Lys Asp Arg Asp Gln Tyr Leu Gly
260 265 270

Val Ala Leu Gly Ile Val Asp Glu Leu Asn His His Val Leu Gln Ile
275 280 285

Leu Ser Leu Ser Ser Val Gln Glu Leu Arg Asp Asp Arg Glu Thr Ile
290 295 300

Asp Leu Leu Gln Met Thr Gln Asn Leu Val Lys Asp Tyr Ala Leu Leu
305 310 315 320

Ala Lys Glu Arg Glu Leu Gln Ile Asp Asn Ser Leu Thr His Gln Gln
325 330 335

Ala Tyr Leu Asn Pro Ser Val Met Lys Leu Ile Leu Ser Asn Leu Ile
340 345 350

Ser Asn Ala Ile Lys His Ser Val Pro Gly Gly Leu Val Arg Ile Gly
355 360 365

Glu Arg Glu Gly Glu Leu Phe Ile Glu Asn Ser Cys Ser Ser Glu Glu
370 375 380

Gln Glu Lys Leu Ala Gln Ser Phe Ser Asp Asn Ala Ser Arg Lys Val
385 390 395 400

Lys Gly Ser Gly Met Gly Leu Phe Val Val Lys Ser Leu Leu Glu His
405 410 415

Glu Lys Leu Ala Tyr Arg Phe Glu Met Glu Glu Asn Ser Leu Thr Phe
420 425 430

Phe Ile Asp Phe Pro Lys Val Val Gln Asp
435 440

<210> 15

<211> 657

<212> DNA

<213> Streptococcus pneumoniae

<400> 15

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tctagctatg aggtggccct ggttttactg gatattccaga tgcccaagct caacggctta 180
gaagtcctag ctgagattcg taaaaccagt caggttcctg tcttgatgtt gacagctttt 240
caagatgagg aatacaagat gagtgccttt gcctcttttg cagatggcta tctggaaaaa 300
cctttctccc tctccctttt aaaagtgagg gtggacgcga ttttcaagcg ctactacgat 360
acaggacgaa tcttttctta caaggatacc aaggtggact ttgaaagcta cagtgcagc 420
ctcgcaggtc aagaagtgcc tatcaatgcc aaagagttgg aaattctgga ctatctagt 480
aaaaatgaag gccgggacct gactcgatct cagattatcg atgccgtctg gaaagcgaca 540
gatgaggttc cctttgaccg tgttattgat gtttatatca aggaattgcg gaaaaagcta 600
gacttggatt gtatcctcac tgtgcgcaat gttgggtata aattggagcg aaaatga 657

<210> 16

<211> 218

<212> PRT

<213> Streptococcus pneumoniae

<400> 16

Met Lys Ile Leu Ile Val Glu Asp Glu Glu Met Ile Arg Glu Gly Val
1 5 10 15

Ser Asp Tyr Leu Thr Asp Cys Gly Tyr Glu Thr Ile Glu Ala Ala Asp
20 25 30

Gly Gln Glu Ala Leu Glu Gln Phe Ser Ser Tyr Glu Val Ala Leu Val
35 40 45

Leu Leu Asp Ile Gln Met Pro Lys Leu Asn Gly Leu Glu Val Leu Ala
50 55 60

Glu Ile Arg Lys Thr Ser Gln Val Pro Val Leu Met Leu Thr Ala Phe
65 70 75 80

Gln Asp Glu Glu Tyr Lys Met Ser Ala Phe Ala Ser Leu Ala Asp Gly
85 90 95

Tyr Leu Glu Lys Pro Phe Ser Leu Ser Leu Leu Lys Val Arg Val Asp
100 105 110

Ala Ile Phe Lys Arg Tyr Tyr Asp Thr Gly Arg Ile Phe Ser Tyr Lys
115 120 125

Asp Thr Lys Val Asp Phe Glu Ser Tyr Ser Ala Ser Leu Ala Gly Gln
130 135 140

Glu Val Pro Ile Asn Ala Lys Glu Leu Glu Ile Leu Asp Tyr Leu Val
145 150 155 160

Lys Asn Glu Gly Arg Ala Leu Thr Arg Ser Gln Ile Ile Asp Ala Val
165 170 175

Trp Lys Ala Thr Asp Glu Val Pro Phe Asp Arg Val Ile Asp Val Tyr
180 185 190

Ile Lys Glu Leu Arg Lys Lys Leu Asp Leu Asp Cys Ile Leu Thr Val
195 200 205

Arg Asn Val Gly Tyr Lys Leu Glu Arg Lys
210 215

<210> 17

<211> 648

<212> DNA

<213> Streptococcus pneumoniae

<400> 17

atgactttat tacaattaca agatgttacc taccgttata agaatactgc tgaagcagtc 60
ctatatcaga tcaattataa ttttgaaccc ggaaaatttt acagtattat tggggagtc 120
ggagcaggaa aatccacact cttgtcccta cttgctgggc tagatagtc tgttgaaggt 180
tctatccttt ttcaaggaga ggatattcgt aagaagggct attcttacca tcgcatgcac 240
catatttccc tgggtctttca aaattataac ttgatagatt atctttctcc gctggaaaat 300
atccgattgg tcaacaaaaa ggcaagcaag aatacacttc ttgagcttgg tttggatgaa 360
agccagatca agcggaatgt tctccagtta tcaggtgggc aacagcaacg tgttgccatt 420
gctcgcagtt tgggtctcaga agctccagtt attctagctg atgagccaac aggaaatctg 480
gatcctaaaa ctgctggaga tattgtcgaa ctactcaaat cacttgccca gaaaacaggt 540
aaatgtgtga ttgtcgtaac tcacagtaaa gaagtggcac aagcgtcaga tattacactt 600
gaattaaagg ataagaaact gactgaaacg cgcaatacta gtaaataa 648

<210> 18

<211> 215

<212> PRT

<213> Streptococcus pneumoniae

<400> 18

Met Thr Leu Leu Gln Leu Gln Asp Val Thr Tyr Arg Tyr Lys Asn Thr
1 5 10 15

Ala Glu Ala Val Leu Tyr Gln Ile Asn Tyr Asn Phe Glu Pro Gly Lys
20 25 30

Phe Tyr Ser Ile Ile Gly Glu Ser Gly Ala Gly Lys Ser Thr Leu Leu
35 40 45

Ser Leu Leu Ala Gly Leu Asp Ser Pro Val Glu Gly Ser Ile Leu Phe

50

55

60

Gln Gly Glu Asp Ile Arg Lys Lys Gly Tyr Ser Tyr His Arg Met His
65 70 75 80

His Ile Ser Leu Val Phe Gln Asn Tyr Asn Leu Ile Asp Tyr Leu Ser
85 90 95

Pro Leu Glu Asn Ile Arg Leu Val Asn Lys Lys Ala Ser Lys Asn Thr
100 105 110

Leu Leu Glu Leu Gly Leu Asp Glu Ser Gln Ile Lys Arg Asn Val Leu
115 120 125

Gln Leu Ser Gly Gly Gln Gln Gln Arg Val Ala Ile Ala Arg Ser Leu
130 135 140

Val Ser Glu Ala Pro Val Ile Leu Ala Asp Glu Pro Thr Gly Asn Leu
145 150 155 160

Asp Pro Lys Thr Ala Gly Asp Ile Val Glu Leu Leu Lys Ser Leu Ala
165 170 175

Gln Lys Thr Gly Lys Cys Val Ile Val Val Thr His Ser Lys Glu Val
180 185 190

Ala Gln Ala Ser Asp Ile Thr Leu Glu Leu Lys Asp Lys Lys Leu Thr
195 200 205

Glu Thr Arg Asn Thr Ser Lys
210 215

<210> 19

<211> 1380

<212> DNA

<213> Streptococcus pneumoniae

<400> 19

atgttacaca acgcatttgc ctatgtttaca aggaagtttt tcaaatacgat tgtcatcttc 60
ctgattattc tctcatggc gagcttgagt ttggctcggt tgtcaatcaa gggagctact 120
gccaaaggctt ctcaggagac ctttaaaaat atcaccaata gcttctccat gcaaatcaat 180
cgtcgcgtca accaaggaac gcctcgtggt gctgggaata tcaagggtga agacatcaaa 240
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gccaaagcgtt ttggaagtag cttgatgatt acaggtgtca atgactcctc taaagaagac 420
aagtttgtct ctggttctta taaactagtc gaaggagagc acttaaccaa cgacgacaag 480
gataaaatcc tcttgcacaa ggacttggca gccaaacacg gctggaaagt aggggacaag 540

gttaaactgg actctaatat ctacgatgca gataatgaaa aaggagccaa ggaaacagtt 600
 gaagtgacaa tcaagggact ctttgatggt cataataagt cagcagtaac ctactcacia 660
 gaacttttacg aaaacacagc tattacagac attcacactg ctgcaaaaact ttatggatac 720
 acagaagaca cagccattta tggggacgca accttctttg taacagcaga caagaacttg 780
 gatgatgta tgaaagagtt gaatggcatc agtgggtatca actggaagag ctacacactc 840
 gtcaagagct cctctaacta cccagctctt gagcaatcta tctctggtat gtacaagatg 900
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<210> 20

<211> 459

<212> PRT

<213> Streptococcus pneumoniae

<400> 20

Met Leu His Asn Ala Phe Ala Tyr Val Thr Arg Lys Phe Phe Lys Ser
 1 5 10 15

Ile Val Ile Phe Leu Ile Ile Leu Leu Met Ala Ser Leu Ser Leu Val
 20 25 30

Gly Leu Ser Ile Lys Gly Ala Thr Ala Lys Ala Ser Gln Glu Thr Phe
 35 40 45

Lys Asn Ile Thr Asn Ser Phe Ser Met Gln Ile Asn Arg Arg Val Asn
 50 55 60

Gln Gly Thr Pro Arg Gly Ala Gly Asn Ile Lys Gly Glu Asp Ile Lys
 65 70 75 80

Lys Ile Thr Glu Asn Lys Ala Ile Glu Ser Tyr Val Lys Arg Ile Asn
 85 90 95

Ala Ile Gly Asp Leu Thr Gly Tyr Asp Leu Ile Glu Thr Pro Glu Thr
 100 105 110

Lys Lys Asn Leu Thr Ala Asp Arg Ala Lys Arg Phe Gly Ser Ser Leu
 115 120 125

Met Ile Thr Gly Val Asn Asp Ser Ser Lys Glu Asp Lys Phe Val Ser
 130 135 140

Gly Ser Tyr Lys Leu Val Glu Gly Glu His Leu Thr Asn Asp Asp Lys
 145 150 155 160
 Asp Lys Ile Leu Leu His Lys Asp Leu Ala Ala Lys His Gly Trp Lys
 165 170 175
 Val Gly Asp Lys Val Lys Leu Asp Ser Asn Ile Tyr Asp Ala Asp Asn
 180 185 190
 Glu Lys Gly Ala Lys Glu Thr Val Glu Val Thr Ile Lys Gly Leu Phe
 195 200 205
 Asp Gly His Asn Lys Ser Ala Val Thr Tyr Ser Gln Glu Leu Tyr Glu
 210 215 220
 Asn Thr Ala Ile Thr Asp Ile His Thr Ala Ala Lys Leu Tyr Gly Tyr
 225 230 235 240
 Thr Glu Asp Thr Ala Ile Tyr Gly Asp Ala Thr Phe Phe Val Thr Ala
 245 250 255
 Asp Lys Asn Leu Asp Asp Val Met Lys Glu Leu Asn Gly Ile Ser Gly
 260 265 270
 Ile Asn Trp Lys Ser Tyr Thr Leu Val Lys Ser Ser Ser Asn Tyr Pro
 275 280 285
 Ala Leu Glu Gln Ser Ile Ser Gly Met Tyr Lys Met Ala Asn Leu Leu
 290 295 300
 Phe Trp Gly Ser Leu Ser Phe Ser Val Leu Leu Leu Ala Leu Leu Leu
 305 310 315 320
 Ser Leu Trp Ile Asn Ala Arg Arg Lys Glu Val Gly Ile Leu Leu Ser
 325 330 335
 Ile Gly Leu Lys Gln Ala Ser Ile Leu Gly Gln Phe Ile Thr Glu Ser
 340 345 350
 Ile Leu Ile Ala Ile Pro Ala Leu Val Ser Ala Tyr Phe Leu Ala Asn
 355 360 365
 Tyr Thr Ala Arg Ala Ile Gly Asn Thr Val Leu Ala Asn Val Thr Ser
 370 375 380
 Gly Val Ala Lys Gln Ala Ser Lys Ala Ala Gln Ala Ser Asn Leu Gly
 385 390 395 400

Gly Gly Ala Glu Val Asp Gly Phe Ser Lys Thr Leu Ser Ser Leu Asp
 405 410 415

Ile Ser Ile Gln Thr Ser Asp Phe Ile Ile Ile Phe Val Leu Ala Leu
 420 425 430

Val Leu Val Val Leu Val Met Ala Leu Ala Ser Ser Asn Leu Leu Arg
 435 440 445

Lys Gln Pro Lys Glu Leu Leu Asp Gly Glu
 450 455

<210> 21
 <211> 1278
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 21

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 tccaacaaaa cagtagaaaag caatctttat aaatcactca atacatcttt ttctattaag 180
 aagatagaga atggtcagac attcaagttg tcagacctag catctgtaag caagattaag 240
 gggctggaaa atgtctctcc tgaacttgag acggctcgcaa aactaaaaga caaggaagca 300
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 agcttaacgg ctcttgagga ttcatccaag gatgtaacct ttaccagttc ggctttcaat 420
 ctaaaagaag ggcgacacct tcaaaaaggg gattccaaga aaatccttat ccacgaagaa 480
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 gaatctggaa aaggacaaac agtagagttt gagattatcg gcatcttttc tggtaaaaaa 600
 caagagaaat tcacagggtt gtcttctgac ttcagtgaag atcaagtctt tacagactat 660
 gaaagtagcc aaaccctttt gggcaatagt gaagctcaag tcagtgcagc acgcttctat 720
 gtagaaaatc ctaaggaaat ggacggactc atgaagcagg tagaaaactt ggccttggaa 780
 aatcaaggct accaagtcga aaaggaaaac aaggcttttg aacaaatcaa agactcagtt 840
 gcaactttcc aaaccttctt gaccatcttc ctttatggga tgttgatagc aggagctgga 900
 gccttaattc tggttttgtc tctctggttg agagaacggg tctatgaagt ggggatttta 960
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 agcagtttat caactagcat cttatctttt gcagaatcct atgtttttct agttctgctt 1200
 agttgcttat ctgtagccct ttgtttccta ttcttattta gaaaatcacc gaaagaaatt 1260
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<210> 22
 <211> 425
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 22

Met Asn Pro Ile Gln Arg Ser Trp Ala Tyr Val Ser Arg Lys Arg Leu
 1 5 10 15
 Arg Ser Phe Ile Leu Phe Leu Ile Leu Leu Val Leu Leu Ala Gly Ile
 20 25 30
 Ser Ala Cys Leu Thr Leu Met Lys Ser Asn Lys Thr Val Glu Ser Asn
 35 40 45
 Leu Tyr Lys Ser Leu Asn Thr Ser Phe Ser Ile Lys Lys Ile Glu Asn
 50 55 60
 Gly Gln Thr Phe Lys Leu Ser Asp Leu Ala Ser Val Ser Lys Ile Lys
 65 70 75 80
 Gly Leu Glu Asn Val Ser Pro Glu Leu Glu Thr Val Ala Lys Leu Lys
 85 90 95
 Asp Lys Glu Ala Val Thr Gly Glu Gln Ser Val Glu Arg Asp Asp Leu
 100 105 110
 Ser Ala Ala Asp Asn Asn Leu Val Ser Leu Thr Ala Leu Glu Asp Ser
 115 120 125
 Ser Lys Asp Val Thr Phe Thr Ser Ser Ala Phe Asn Leu Lys Glu Gly
 130 135 140
 Arg His Leu Gln Lys Gly Asp Ser Lys Lys Ile Leu Ile His Glu Glu
 145 150 155 160
 Leu Ala Lys Lys Asn Gly Leu Ser Leu His Asp Lys Ile Gly Leu Asp
 165 170 175
 Ala Gly Gln Ser Glu Ser Gly Lys Gly Gln Thr Val Glu Phe Glu Ile
 180 185 190
 Ile Gly Ile Phe Ser Gly Lys Lys Gln Glu Lys Phe Thr Gly Leu Ser
 195 200 205
 Ser Asp Phe Ser Glu Asn Gln Val Phe Thr Asp Tyr Glu Ser Ser Gln
 210 215 220
 Thr Leu Leu Gly Asn Ser Glu Ala Gln Val Ser Ala Ala Arg Phe Tyr
 225 230 235 240
 Val Glu Asn Pro Lys Glu Met Asp Gly Leu Met Lys Gln Val Glu Asn
 245 250 255

Leu Ala Leu Glu Asn Gln Gly Tyr Gln Val Glu Lys Glu Asn Lys Ala
260 265 270

Phe Glu Gln Ile Lys Asp Ser Val Ala Thr Phe Gln Thr Phe Leu Thr
275 280 285

Ile Phe Leu Tyr Gly Met Leu Ile Ala Gly Ala Gly Ala Leu Ile Leu
290 295 300

Val Leu Ser Leu Trp Leu Arg Glu Arg Val Tyr Glu Val Gly Ile Leu
305 310 315 320

Leu Ala Leu Gly Lys Gly Lys Ser Ser Ile Phe Leu Gln Phe Cys Leu
325 330 335

Glu Val Val Leu Val Ser Leu Gly Ala Leu Leu Pro Ala Phe Val Ala
340 345 350

Gly Asn Ala Ile Thr Thr Tyr Leu Leu Gln Thr Leu Leu Ala Ser Gly
355 360 365

Asp Gln Ala Ser Leu Gln Asp Thr Leu Ala Lys Ala Ser Ser Leu Ser
370 375 380

Thr Ser Ile Leu Ser Phe Ala Glu Ser Tyr Val Phe Leu Val Leu Leu
385 390 395 400

Ser Cys Leu Ser Val Ala Leu Cys Phe Leu Phe Leu Phe Arg Lys Ser
405 410 415

Pro Lys Glu Ile Leu Ser Ser Ile Ser
420 425

<210> 23

<211> 1407

<212> DNA

<213> Streptococcus pneumoniae

<400> 23

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aggtgacaaa tgaatccaat ccaaagatct tgggcttatg tcagcagaaa gcgactgaga 180
agttttatatt tatttctgat tttattgggc ttattggccg gaatttcagc ctgtttgact 240
ctgatgaagt ccaacaaaaac agtagaaagc aatctttata aatcactcaa tacatctttt 300
tctattaaga agatagagaa tggtcagaca ttcaagttgt cagacctagc atctgtaagc 360
aagattaagg ggctggaaaa tgtctctcct gaacttgaga cggctcgcaa actaaaagac 420
aaggaagcag tgactggcga gcagagcgtg gagcgtgatg atttatcagc tgcagacaat 480

aacttggtta gcttaacggc tcttgaggat tcatccaagg atgtaacctt taccagttcg 540
gctttcaatc taaaagaagg gcgacacctt caaaaagggg attccaagaa aatccttate 600
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Asp Lys Glu Ala Val Thr Gly Glu Gln Ser Val Glu Arg Asp Asp Leu
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115 120 125

Ser Lys Asp Val Thr Phe Thr Ser Ser Ala Phe Asn Leu Lys Glu Gly

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112

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<223> It can be any amino acid.

<220>

<221> VARIANT

<222> (13)..(15)

<223> They can be any amino acid.

<220>

<221> VARIANT

<222> (17)..(20)

<223> They can be any amino acid.

<220>

<221> VARIANT

<222> (22)..(24)

<223> They can be any amino acid.

121

A

<400> 43

Met Xaa Xaa Xaa Xaa Xaa Asn Val Leu Ser Xaa Gly Xaa Xaa Xaa Ala
1 5 10 15

Xaa Xaa Xaa Xaa Ala Xaa Xaa Xaa Asn
20 25

<210> 44

<211> 27

<212> PRT

<213> Streptococcus pneumoniae

<400> 44

Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln Leu Leu Ala
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Tyr Asn Arg Lys
20 25

<210> 45

<211> 312

<212> DNA

<213> Streptococcus pneumoniae

<400> 45

aatttgaaaa aatgagtcta gaataaagat tgcattctgt gtttctattc aagaatagtg 60
gataggaatg gctatttaac aattcaaaat aaatccgaaa gcagtgggtga aaatcattgc 120
tttcagttgc tttctttgta ctttagtgct taaatataat atactaaagt tatggaattt 180
atgagaaagg aatttcacaa cgttttatct agtgggtcagt tgcttgcaga caaaaggcca 240
gcaagagact ataatagaaa atagggtagg tatttattct aagaaaaata aaaaatagag 300
agcagttaaa gt 312

<210> 46

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 46

aatgagtcta gaataaagat tgc 23

<210> 47

<211> 27

<212> PRT

122

A

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Modified
Streptococcus Pneumonia peptide

<400> 47

Met Arg Lys Glu Phe His Asn Val Leu Ser Ala Gly Gln Leu Leu Ala
1 5 10 15

Asp Lys Arg Pro Ala Arg Asp Tyr Asn Arg Lys
20 25

<210> 48

<211> 30

<212> PRT

<213> Streptococcus pneumoniae

<400> 48

Met Glu Phe Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Gly Gln
1 5 10 15

Leu Leu Ala Asp Lys Arg Pro Ala Arg Asp Tyr Asn Arg Lys
20 25 30

<210> 49

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 49

acgaagaatt cgctaagaag aacggt

26

<210> 50

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 50

attaaggatc cagctatcaa

20

123

A

<210> 51
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 51
atcaagggat ccactgccaa ggc 23

<210> 52
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

01
<400> 52
agaggagaat tcccacttcc ttgcg 25

<210> 53
<211> 81
<212> DNA
<213> Streptococcus pneumoniae

<400> 53
atgagaaagg aatttcacaa cgttttatct agtggtcagt tgcttgcaga caaaaggcca 60
gcaagagact ataatagaaa a 81

<210> 54
<211> 90
<212> DNA
<213> Streptococcus pneumoniae

<400> 54
atggaattta tgagaaagga atttcacaac gttttatcta gtggtcagtt gcttgcagac 60
aaaaggccag caagagacta taatagaaaa 90

<210> 55
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Consensus

<220>

<221> PEPTIDE

<222> (1)

<223> Xaa can be Leu or Tyr

<220>

<221> PEPTIDE

<222> (5)

<223> Xaa can be Gln or Met

<400> 55

Xaa Ser Gly Gly Xaa

1

5

<210> 56

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 56

acgaagaatt cgctaagaag aacggt

26

<210> 57

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 57

attaaggatc cagctatcaa

20

<210> 58

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 58

atcaagggat ccactgccaa ggc

23

<210> 59
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 59
agaggagaat tcccacttcc ttgcg 25

<210> 60
<211> 27
<212> PRT
<213> Streptococcus Pneumoniae

<220>
<223> Description of Artificial Sequence: Synthetic
amino acids

Q1
<400> 60
Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Asp Gln Leu Leu Thr
1 5 10 15
Asp Lys Arg Pro Ala Arg Asp Tyr Asn Arg Lys
20 25

<210> 61
<211> 25
<212> PRT
<213> Streptococcus Pneumoniae

<220>
<223> Description of Artificial Sequence: Synthetic
amino acids

<400> 61
Met Arg Lys Glu Phe His Asn Val Leu Ser Ser Asp Gln Leu Leu Thr
1 5 10 15
Asp Lys Arg Pro Ala Arg Asp Tyr Asn
20 25

<210> 62
<211> 33

<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
amino acids

<400> 62
Gln Asn Tyr Asn Leu Ile Asp Tyr Leu Ser Pro Leu Glu Asn Ile Arg
1 5 10 15

Leu Val Asn Lys Lys Ala Ser Lys Asn Thr Leu Leu Glu Leu Gly Leu
20 25 30

Asp

<210> 63
<211> 33
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
amino acids

<400> 63
Gln Asn Tyr Asn Leu Ile Asp Tyr Leu Ser Pro Leu Glu Asn Ile Gln
1 5 10 15

Leu Val Asn Lys Lys Ala Ser Lys Asp Thr Leu Leu Glu Leu Gly Leu
20 25 30

Asp

<210> 64
<211> 215
<212> PRT
<213> Streptococcus Pneumoniae

<400> 64
Met Thr Leu Leu Gln Leu Gln Asp Val Thr Tyr Arg Tyr Lys Asn Thr
1 5 10 15

Ala Glu Ala Val Leu Tyr Gln Ile Asn Tyr Asn Phe Glu Pro Gly Lys

127

A

20

25

30

Phe Tyr Ser Ile Ile Gly Glu Ser Gly Ala Gly Lys Ser Thr Leu Leu
35 40 45

Ser Leu Leu Ala Gly Leu Asp Ser Pro Val Glu Gly Ser Ile Leu Phe
50 55 60

Gln Gly Glu Asp Ile Arg Lys Lys Gly Tyr Ser Tyr His Arg Met His
65 70 75 80

His Ile Ser Leu Val Phe Gln Asn Tyr Asn Leu Ile Asp Tyr Leu Ser
85 90 95

Pro Leu Glu Asn Ile Gln Leu Val Asn Lys Lys Ala Ser Lys Asp Thr
100 105 110

Leu Leu Glu Leu Gly Leu Asp Glu Ser Gln Ile Lys Arg Asn Val Leu
115 120 125

Gln Leu Ser Gly Gly Gln Gln Gln Arg Val Ala Ile Ala Arg Ser Leu
130 135 140

Val Ser Glu Ala Pro Val Ile Leu Ala Asp Glu Pro Thr Gly Asn Leu
145 150 155 160

Asp Pro Lys Thr Ala Gly Asp Ile Val Glu Leu Leu Lys Ser Leu Ala
165 170 175

Gln Lys Thr Gly Lys Cys Val Ile Val Val Thr His Ser Lys Glu Val
180 185 190

Ala Gln Ala Ser Asp Ile Thr Leu Glu Leu Lys Asp Lys Lys Leu Thr
195 200 205

Glu Thr Arg Asn Thr Ser Lys
210 215

<210> 65

<211> 84

<212> DNA

<213> Streptococcus Pneumoniae

<400> 65

atgagaaagg aatttcacaa cgttttatct agtgggtcagt tgcttgacaga caaaaggcca 60
gcaagagact ataataaaaa atag 84

<210> 66
<211> 84
<212> DNA
<213> Streptococcus pneumoniae

<400> 66
atgagaaagg aatttcacaa cgttttatct agtgatcagt tgcttacaga caaaaggcca 60
gcaagagact ataatagaaa atag 84

<210> 67
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 67
ctgctgaagc agtcctatat 20

<210> 68
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 68
ttcgacaata tctccagcag 20

<210> 69
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 69
gagctcttgc tggatggtga 20

<210> 70
<211> 20
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 70

cctcacggat catctcttca

20

<210> 71

<211> 675

<212> DNA

<213> Streptococcus pneumoniae

<400> 71

atgactttat tacaattaca agatgttacc taccgttata agaatactgc tgaagcagtc 60
ccatataaga atactgctga agcagtccta tatcagatca attataatctt tgaacccgga 120
aaattttaca gtattattgg ggagtcagga gcaggaaaat ccacactctt gtccctactt 180
gctgggtctag atagtcctgt tgaagggttct atcctttttc aaggagagga tattcgtaag 240
aagggtctatt cttaccatcg catgcaccat atttccttgg tctttcaaaa ttataacttg 300
atagattatc tttctccgct ggaaaatcgc cgattgggtca acaaaaaggc aagcaaggat 360
acacttcttg agcttgggtt ggatgaaagt cagatcaagc ggaatgttct ccagttatca 420
gggtgtcaac agcaacgtgt tgccattgct cgcagtttgg tctcagaagc tccagttatt 480
ctagctgatg agccaacagg aaatctggat cctaaaactg ctggagatat tgtcgaacta 540
ctcaaatac ttgcccagaa aacaggtaaa tgtgtgattg tcgtaactca cagtaaagaa 600
gtggcacaag cgtcagatat tacacttgaa ttaaaggata agaaactgac tgaaacgcgc 660
aatactagta aataa 675

<210> 72

<211> 224

<212> PRT

<213> Streptococcus pneumoniae

<400> 72

Met Thr Leu Leu Gln Leu Gln Asp Val Thr Tyr Arg Tyr Lys Asn Thr
1 5 10 15
Ala Glu Ala Val Pro Tyr Lys Asn Thr Ala Glu Ala Val Leu Tyr Gln
20 25 30
Ile Asn Tyr Asn Phe Glu Pro Gly Lys Phe Tyr Ser Ile Ile Gly Glu
35 40 45
Ser Gly Ala Gly Lys Ser Thr Leu Leu Ser Leu Leu Ala Gly Leu Asp
50 55 60
Ser Pro Val Glu Gly Ser Ile Leu Phe Gln Gly Glu Asp Ile Arg Lys
65 70 75 80
Lys Gly Tyr Ser Tyr His Arg Met His His Ile Ser Leu Val Phe Gln
85 90 95

Asn Tyr Asn Leu Ile Asp Tyr Leu Ser Pro Leu Glu Asn Ile Arg Leu
 100 105 110
 Val Asn Lys Lys Ala Ser Lys Asp Thr Leu Leu Glu Leu Gly Leu Asp
 115 120 125
 Glu Ser Gln Ile Lys Arg Asn Val Leu Gln Leu Ser Gly Gly Gln Gln
 130 135 140
 Gln Arg Val Ala Ile Ala Arg Ser Leu Val Ser Glu Ala Pro Val Ile
 145 150 155 160
 Leu Ala Asp Glu Pro Thr Gly Asn Leu Asp Pro Lys Thr Ala Gly Asp
 165 170 175
 Ile Val Glu Leu Leu Lys Ser Leu Ala Gln Lys Thr Gly Lys Cys Val
 180 185 190
 Ile Val Val Thr His Ser Lys Glu Val Ala Gln Ala Ser Asp Ile Thr
 195 200 205
 Leu Glu Leu Lys Asp Lys Lys Leu Thr Glu Thr Arg Asn Thr Ser Lys
 210 215 220

<210> 73
 <211> 675
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 73
 atgactttat tacaattaca agatgttacc taccgttata agaatactgc tgaagcagtc 60
 ccatataaga atactgctga agcagtccta tatcagatca attataattt tgaacccgga 120
 aaattttaca gtattattgg ggagtcagga gcaggaaaat ccacactctt gtcctactt 180
 gctggtctag atagtcctgt tgaaggttct atcctttttc aaggagagga tattcgtaag 240
 aagggctatt cttaccatcg catgcaccat atttccctgg tctttcaaaa ttataacttg 300
 atagattatc tttctccgct ggaaaatata cgattggtca acaaaaaggc aagcaaggat 360
 acacttcttg agcttggttt ggatgaaagt cagatcaagc ggaatgttct ccagttatca 420
 ggtggtcaac agcaacgtgt tgccattgct cgcagtttgg tctcagaagc tccagttatt 480
 ctgactgatg agccaacagg aaatctggat cctaaaactg ctggagatat tgtcgaacta 540
 ctcaaatacac ttgccagaa aacaggtaaa tgtgtgattg tcgtaactca cagtaaagaa 600
 gtggcacaag cgtcagatat tacacttgaa ttaaaggata agaaactgac tgaaacgcgc 660
 aatactagta aataa 675

<210> 74

<211> 224

<212> PRT

<213> Streptococcus pneumoniae

<400> 74

Met Thr Leu Leu Gln Leu Gln Asp Val Thr Tyr Arg Tyr Lys Asn Thr
1 5 10 15

Ala Glu Ala Val Pro Tyr Lys Asn Thr Ala Glu Ala Val Leu Tyr Gln
20 25 30

Ile Asn Tyr Asn Phe Glu Pro Gly Lys Phe Tyr Ser Ile Ile Gly Glu
35 40 45

Ser Gly Ala Gly Lys Ser Thr Leu Leu Ser Leu Leu Ala Gly Leu Asp
50 55 60

Ser Pro Val Glu Gly Ser Ile Leu Phe Gln Gly Glu Asp Ile Arg Lys
65 70 75 80

Lys Gly Tyr Ser Tyr His Arg Met His His Ile Ser Leu Val Phe Gln
85 90 95

Asn Tyr Asn Leu Ile Asp Tyr Leu Ser Pro Leu Glu Asn Ile Arg Leu
100 105 110

Val Asn Lys Lys Ala Ser Lys Asp Thr Leu Leu Glu Leu Gly Leu Asp
115 120 125

Glu Ser Gln Ile Lys Arg Asn Val Leu Gln Leu Ser Gly Gly Gln Gln
130 135 140

Gln Arg Val Ala Ile Ala Arg Ser Leu Val Ser Glu Ala Pro Val Ile
145 150 155 160

Leu Ala Asp Glu Pro Thr Gly Asn Leu Asp Pro Lys Thr Ala Gly Asp
165 170 175

Ile Val Glu Leu Leu Lys Ser Leu Ala Gln Lys Thr Gly Lys Cys Val
180 185 190

Ile Val Val Thr His Ser Lys Glu Val Ala Gln Ala Ser Asp Ile Thr
195 200 205

Leu Glu Leu Lys Asp Lys Lys Leu Thr Glu Thr Arg Asn Thr Ser Lys
210 215 220

132

A

<210> 75
 <211> 1281
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 75
 atgaatccaa tccaaagatc ttgggcttat gtcagcagaa agcgactgag aagttttatt 60
 ttattttctga ttttattggg cttattggcc ggaatttcag cctgtttgac tctgatgaag 120
 tccaacaaaa cagtagaaaag caatctttat aaatcactca atacatcttt ttctattaag 180
 aagatagaga atggtcagac attcaagttg tcagacctag catctgtaag caagattaag 240
 gggctggaaa atgtctctcc tgaacttgag acggctgcaa aactaaaaga caaggaagca 300
 gtgactggcg agcagagcgt ggagcgtgat gatttatcag ctgcagacaa taacttgggt 360
 agcttaacgg ctcttgagga ttcattccaag gatgtaacct ttaccagttc ggctttcaat 420
 ctaaaagaag ggcgacacct tcaaaaaggg gattccaaga aaatccttat ccacgaagaa 480
 gaattggcta agaagaacgg tctttcgctt catgacaaga ttggcttgga tgctgggcag 540
 tctgaatctg gaaaaggaca aacagtagag ttgagatta ttggcatctt ttctggtaaa 600
 aaacaagaga aattcacagg cttgtcttct gacttcagtg aaaatcaagt ctttacagac 660
 tatgaaagta gccaaacctt tttgggcaat agtgaagctc aagtcagtgc agcacgcttc 720
 tatgtagaaa atcctaagga aatggacgga ctcatgaagc aggtagaaaa cttggccttg 780
 gaaaatcaag gctaccaagt cgaaaaggaa aacaaggctt ttgaacaaat caaagactca 840
 gttgcaactt tccaaacctt cctgaccatc ttcctttatg ggatgttgat agcaggagct 900
 ggagccttaa ttctggtttt gtctctctgg ttgagagaac gggcttatga agtggggatt 960
 ttacttgcac ttggaaaagg caagagctcg atcttctac aattctgttt agaggtagtt 1020
 ttggtatctc ttggagcttt gcttccagca tttgttgag gaaacgcaat cacaacttac 1080
 ctactccaaa ctctactagc aagtggagat caggcaagct tacaagatac actagccaaa 1140
 gcaagcagtt tatcaactag catcttatct tttgcagaat cctatgtttt tctagttctg 1200
 cttagtgtct tatctgtagc cctttgtttc ctattcttat ttagaaaatc accgaaagaa 1260
 attttatcat ctattagtta a 1281

<210> 76
 <211> 224
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 76
 Met Thr Leu Leu Gln Leu Gln Asp Val Thr Tyr Arg Tyr Lys Asn Thr
 1 5 10 15
 Ala Glu Ala Val Pro Tyr Lys Asn Thr Ala Glu Ala Val Leu Tyr Gln
 20 25 30
 Ile Asn Tyr Asn Phe Glu Pro Gly Lys Phe Tyr Ser Ile Ile Gly Glu
 35 40 45
 Ser Gly Ala Gly Lys Ser Thr Leu Leu Ser Leu Leu Ala Gly Leu Asp

50

55

60

Ser Pro Val Glu Gly Ser Ile Leu Phe Gln Gly Glu Asp Ile Arg Lys
65 70 75 80

Lys Gly Tyr Ser Tyr His Arg Met His His Ile Ser Leu Val Phe Gln
85 90 95

Asn Tyr Asn Leu Ile Asp Tyr Leu Ser Pro Leu Glu Asn Ile Arg Leu
100 105 110

Val Asn Lys Lys Ala Ser Lys Asp Thr Leu Leu Glu Leu Gly Leu Asp
115 120 125

Glu Ser Gln Ile Lys Arg Asn Val Leu Gln Leu Ser Gly Gly Gln Gln
130 135 140

Gln Arg Val Ala Ile Ala Arg Ser Leu Val Ser Glu Ala Pro Val Ile
145 150 155 160

Leu Ala Asp Glu Pro Thr Gly Asn Leu Asp Pro Lys Thr Ala Gly Asp
165 170 175

Ile Val Glu Leu Leu Lys Ser Leu Ala Gln Lys Thr Gly Lys Cys Val
180 185 190

Ile Val Val Thr His Ser Lys Glu Val Ala Gln Ala Ser Asp Ile Thr
195 200 205

Leu Glu Leu Lys Asp Lys Lys Leu Thr Glu Thr Arg Asn Thr Ser Lys
210 215 220

134

A